Industrial Shrimp cultivation and
Related Issues in Respect of
South-West Coastal Region of
Bangladesh
ASHRAF-UL-ALAM TUTU

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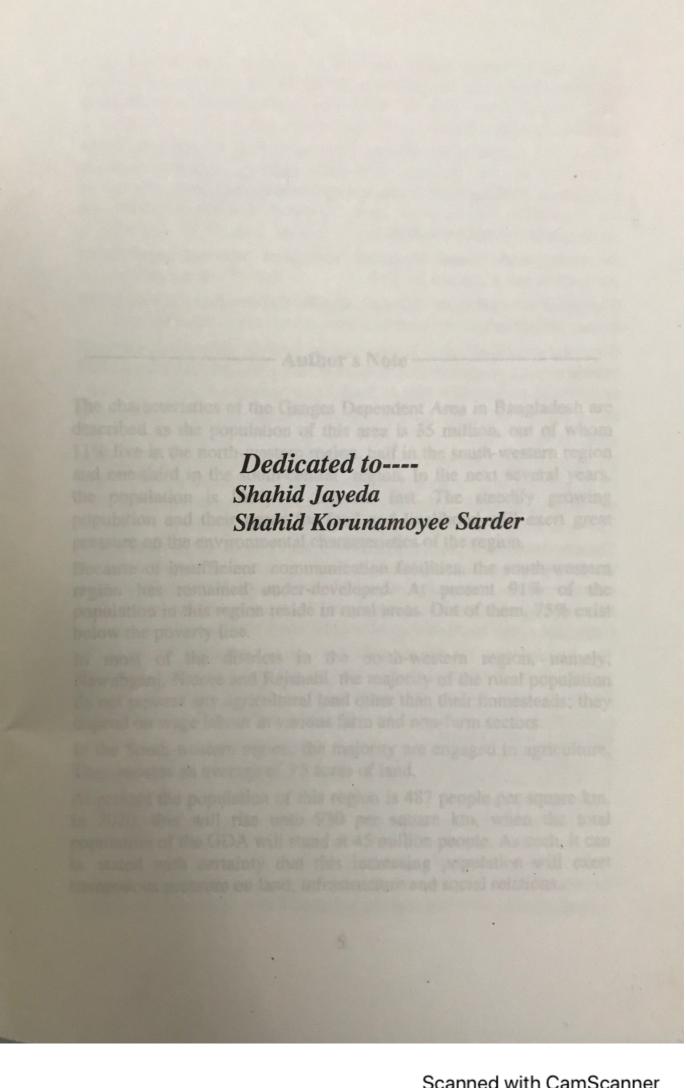
Dedicated to----

Shahid Jayeda

Shahid Korunamoyee Sarder

Author's Note

The characteristics of the Ganges Dependent Area in Bangladesh are described as the population of this area is 35 million, out of whom 11% live in the north-western region, half in the south-western region and one-third in the south-central region. In the next several years, the population is likely to increase fast. The steadily growing population and their needs for food and livelihood will exert great pressure on the environmental characteristics of the region.

Because of insufficient communication facilities, the south-western region has remained under-developed. At present 91% of the population in this region reside in rural areas. Out of them, 75% exist below the poverty line.

In most of the districts in the north-western region, namely, Nawabganj, Natore and Rajshahi, the majority of the rural population do not possess any agricultural land other than their homesteads; they depend on wage labour in various farm and non-farm sectors.

In the South-western region, the majority are engaged in agriculture. They possess an average of 3·5 acres of land.

At present the population of this region is 487 people per square km. In 2020, this will rise upto 930 per square km, when the total population of the GDA will stand at 45 million people. As such, it can be stated with certainty that this increasing population will exert tremendous pressure on land, infrastructure and social relations.

In the south-western region, the rate of literacy varies according to localities. In a study conducted in 1991, the rate of literacy in some areas ranged from 37% to 50%. But among small and marginal farmers, the rate is lower.

About 75% people of the Ganges Dependent Area are engaged in the cultivation of rice, together with cattle rearing, preparing land for cultivation, husking of rice and other processing activities. The rest of the population live by petty trade, transport, cottage industries and wage labour in various sectors.

In recent years, some successes have been achieved; agricultural production has increased by 50%.

Compared to absentee owners, small land-owners are achieving higher productivity.

The total cultivable area in the country is 34.2 million acres, out of which rice is produced in 15 million acres. At present Bangladesh imports 2.5 to 3 million tons of foodgrains per year.

Great efforts will have to be taken to face the challenges of the new millenium.

By cultivating two crops in a year, it will be possible to produce 40 to 50 million tons of foodgrains from these 15 million acres of land, which will make Bangladesh an important food exporting country. This will reduce poverty in the country to a great extent.

The south-western portion of GDA is also known as the South-west Coastal Region. This region has unique and highly sensitive natural characteristics and possesses an abundance of Natural Resources. Commercial Shrimp Cultivation in this region is the subject of important socio-economic and environmental issues.

The Sundarbans, the largest mangrove eco-system that exists in the world today, is situated in this region. But the Sundarban Reserved Forest is now being threatened as a result of Industrial Shrimp cultivation. Shrimp cultivation has also caused other environmental damages, which include:

- Cultivation of vegetables has suffered due to soil salinity.
- Cattle are dying because of brackishness of water and lack of grass for fodder.
- Due to increasing salinity of the water many fresh water fishes are becoming extinct.
- In the process of collecting shrimp fry with nets about 97 varieties of fish fry are beingdestroyed, resulting in damage to aquatic bio-diversity and depletion of fish resources in the region.

- Salinity is damaging the bio-diversity of the region, causing imbalance in ecology.
- Salinity is increasing every year; there is a serious crisis of fresh water for drinking
and cooking.
- The insecurity of women has increased. The outsiders engaged as guards in the
shrimp enclosures molest local women. Such incidents as kidnapping, rape and other forms of female harassment are increasing day by day.
- As the majority of shrimp farmers are outsiders, they have no interest in the social and natural environment of the region.

Upokulio Unnayan Shahojogy (known in English as Coastal Development Partnership or (CDP) is a development organization working in this South-western Coastal region. CDP helps identify the environmental and socio-economic issues and to develop an appropriate perspective about them. The main responsibility undertaken by CDP is to form issue-based networks with like-minded organizations working in this region.

The PADMA Network has been formed with NGOs working in the Ganges Dependent Area, with the purpose of increasing the awareness of the people in the Ganges Dependent Area of Bangladesh about water resource management and environment, ensuring peoples' participation in long-term development projects, identifying the environmental issues of the GDA, and to provide the people with necessary information about river management and socio-economic development projects.

The PADMA Network regularly publishes bulletins, booklets, research and study reports etc. The PRIP TRUST is the donor organization for the PADMA Network. We hereby acknowledge with gratitude the financial assistance being provided by Ms.Aroma Dutta, Executive Director of The PRIP TRUST for publishing this booklet.

With Best Regards

Date : 7th April, 2001

Ashraf ul Alam Tutu

Ashraf-ul-Alam Tutu
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Introduction:

The rapid expansion of aqua-culture of shrimps in the South-Western Coastal Region of Bangladesh has given birth to a hot debate about the pros and cons of developing what had previously been a non-traditional export item into an expanding sector with great potential for growth. The industry itself has given birth to a number of environmental, social and economic problems. This is a brief resume of the growth of the industry in the region and the issues it has generated.

Area Identification:

The area generally understood as the western portion of the South-Western Coastal Region of Bangladesh consists of the districts of Satkhira, Khulna and Bagerhat and the southern portion of Jessore district. These areas, specially the southern part, are also identified as the "Shrimp Region" of Bangladesh. A major portion of the so called "Shrimp region" falls under the Impact Zone of the Sunderbans.

All the thanas in these districts contribute, in one way or the other, towards ensuring a steady supply of shrimps to the processing factories which export processed shrimp and earn foreign exchange. But there are many areas within almost all thanas which are also shrimp-free, and which present a marked contrast to the environmental and socio-economic situation prevailing in the predominantly shrimp regions. There is also a clear geographical division as regards the variety of shrimps cultivated

Brackish water Bagda shrimps are grown in the following areas :

District	Upazila/Thana
Satkhira	Tala, Satkhira, Debhata, Kaligonj, Assasuni and Shyamnagar
Khulna	Koyra, Paikgacha, Rupsa, Batiaghata, Dacope and portions of Dumuria
Bagerhat	Mongla, Rampal and southern portions of Fakirhat, Bagerhat and Morrelganj

Fresh water Golda Prawns are cultivated in the following areas: -

District	Upazila/Thana
Jessore	Keshabpur, Monirampur and Abhoynagar.
Khulna	Terokhada and parts of Dumuria.
Bagerhat	Mollahat, Chitalmari and the northern portions of Bagerhat, Fakirhat and Morrelgonj.

This divide between the fresh water region and brackish water region actually dictated the species of shrimp to be cultivated.

All these shrimp areas used to be tidal flood plains, lying below high-tide level. The inhabitants lived in villages which were built on slightly higher lands which were artificially raised by means of digging ponds to fill low lands and make them high enough for building houses and establishing homestead orchards and vegetable plots. The low lying flood plains used to be inundated twice daily by the diurnal tides.

During the monsoon, the farmers built temporary dikes to prevent tidal incursion and wooden sluices to let out surplus rain water, and cultivated indigenous, salinity-tolerant and flood tolerant varieties of rice. After the harvest, the dikes and sluices were dismantled and the tides again given free play in the flood plains until the next monsoon. The stubble remaining after the harvest and the Sunderban detritus brought in by the tides, decomposed in the water and produced an abundance of organic food for fish and other marine creatures, resulting in an abundance of fish and crustaceans in the tidal flood plains and the creeks and rivers of the region.

Though cultivation of these lands was based on ownership or other acquired rights, fishing in the flood plains was free for all, and during the fallow period between the winter harvest and the next monsoon, all these lands bore the character of a public domain. Thus even the landless used to enjoy the benefits of those lands through sustenance fishing.

Traditional Shrimp Farming :

Monoculture of shrimp is not at all a new phenomenon in the south-western coastal region. Farmers in this tidal flood plain used to construct shallow, seasonal enclosures on the banks of rivers and canals, and grew brackish water Finfish of various species, such as Pashya, Bhetki, Tengra etc, along with Bagda shrimps, and they considered it as a source of supplementary income. They also grew fresh water Golda Prawns in their homestead ponds along with other species of fish. These shrimps and prawns used to fulfil the local consumer demand as well as that of the few processing plants existing in the Khulna region at that time. This practice did not significantly affect either the environment or the social fabric.

When the demand for shrimps began to increase with the establishment of more and more freezing and processing plants in the Khulna region in response to rapid increase in international demand during the 1980's, the proportion of Bagda shrimps began to be gradually increased, until ultimately Bagda shrimp culture dominated the economy of the brackish water regions of the Southwest.

Serious water-logging in the Coastal Embankment areas also gave a strong impetus to shrimp cultivation.

Coastal Embankments and Water-Logging :
In the 1960's the then government of East Pakistan felt the need for enhancing rice production to feed the fast growing population. Prices of foodgrains were rising worldwide, and the government therefore wanted to enhance domerstic production. Fortunately, the period also coincided with the development of High Yielding Varieties (HYV) of grains, first wheat and then rice. The tidal flood plains of the south-western coastal region were single-crop lands producing only one crop of local varieties of rice during the monsoon. The government therefore decided to convert those lands into permanent fresh water areas and to provide facilities for year-round cultivation of High Yielding Varieties (HYV) of rice.

Accordingly, 37 polders were created by building a total of 1566 km of high embankments and 282 sluices and regulators, as well as closing many tidal creeks in the Khulna region alone. For about 15 years after the construction of the embankments, the project gave good results, as the farmers were able to produce two or even three crops in a year. The productivity was also high, as the period coincided with the advent of High Yielding Varieties(HYV) of rice.

But the problems were slowly building up. The diurnal tides used to carry large quantities of silt, which used to be deposited on the flood plains, thus compensating for the subsidence natural to all delta soils. But now that entry into the flood plains was denied to the tides by the embankments, the silt was deposited on the river beds. Gradually, within a decade and a half, the river-beds rose above the level of the crop lands within the polders, and the mouths of the sluices were also blocked by silt, as a result of which the monsoon rain water could not drain off, thus creating water-logging. Gradually, this water-logging became a permanent feature of the region, spreading gradually from the north to the south.

Golda Prawn Farming :

The phenomenon of water-logging was first experienced in the fresh-water areas in the north, such as in Mollahat, Chitalmari and parts of Fakirhat in Bagerhat district, Terokhada and parts of Dumuria in Khulna district and Keshabpur, Monirampur and Abhoynagar in Jessore district. At first, the people of the water-logged areas, on realising that normal agricultural pursuits would be impossible on their water-logged lands, were at a loss to find ways and means to utilise their lands productively. A few brave souls experimented with small-scale Golda cultivation in their small water-logged plots. Their success encouraged the others and the practice spread gradually.

The first areas to come under small scale Golda Prawn cultivation were the Kola Beel and Basuakhali Beel in Terokhada thana of Khulna district and Beel Dhabalia, Beel Kapalia, Beel Kendua, Beel Moubhog, Beel Kapdanga etc. in the Fakirhat-Mollahat-Chitalmari region of Bagerhat district.

The initiative was so successful that the areas around the villages Faltita and Arpara came to be known as the "Kuwait of Bangladesh".

Apparently, the general socio-economic situation in these fresh-water Golda farming areas are better than their counterparts in other shrimp culture areas, or even in agricultural, shrimp-free areas. But if one considers the experience of other areas where monoculture in any form has been practised, it will be seen that the situation is not sustainable. The environmental degradation may be slow to develop in fresh-water areas, but there is no denying the fact that degradation of the environment does occur, and once the process has set in, its socio-economic impacts will begin to surface. As such, the present socio-economic well being of the areas are not likely to be sustainable.

Seepage of impurities into the underground water table from the excreta and unconsumed feeds given to the prawns, dying off of trees due to sustained rise in the water-table, the loss of bio-diversity caused by the gradual elimination of food and shelter for birds and insects, elimination of frogs and other amphibians considered as "threats" to the prawn fry, the destruction of large numbers of fry of other varieties of fish and shrimp while collecting prawn fry and post-larvae from the rivers and estuaries, etc. are the factors that will bring about degradation of the environment in those areas.

In Jessore district, in the shrimp growing thanas of Keshabpur, Monirampur and Abhoynagar also, the present situation is similar to that in Bagerhat, with a predominance of small-scale Golda enclosures (ghers) in the water-logged areas, though there had been a few attempts to establish large ghers during the late 1980's, which ultimately resulted in social conflicts including a few untoward incidents of violence which shall be related later on.

Bagda Shrimp Cultivation :

Not only the saline nature of land and water, but also the manner in which shrimp-culture spread in the southern regions of Khulna, Bagerhat and Satkhira districts have contributed to the rapid degradation of environmental and socio-economic situation in those areas. Even then, there are great differences in the nature of shrimp cultivation in different thanas as well as between different areas in the same thana.

Bagda shrimp cultivation started in these regions on a comparatively large-scale "extensive" basis, and it has remained so till date. Here most of the shrimp farmers are not themselves permanent residents of the areas in which their "ghers" are situated. Even the local big land-owners who converted their lands into shrimp ponds live in urban centres.

Before the shrimp era, the big land-owners used to rent out their lands for cultivation of rice either against cash or on share-cropping basis. When outside enterpreneurs approached them to lease their lands for shrimp cultivation, they were too glad to accommodate them, because the land-owners would then be relieved of the trouble of dealing with a host of small share-croppers, as well as of collecting the share in kind and then disposing of the same.

Except in Shyamnagar thana of Satkhira district, this has been the manner in which shrimp cultivation commenced in the region. Though many of the outsiders later withdrew from the region, and the local land-owners or small groups took over, many outsiders still remain. In Shyamnagar, however, large scale shrimp cultivation was started by local land-owners themselves, and there is no outside influence working there. But the Shyamnagar methodology is different and quite unique. The Shyamnagar gher-owners use mechanised pumps to lift brackish water into their "ghers".

Impacts of Brackish Water Shrimp Culture :

Undoubtedly, shrimp export brings in a large amount of foreign exchange for the country. The latest figures for the fiscal year 1999-2000 is 18.11 billion takas, which makes it the third most important foreign exchange earner, exceeded only by readymade garments and remittances of expatriate Bangladeshi workers. But even such "macro" benefits seem insignificant in the face of the massive environmental degradation and socio-economic upheaval in the region and their concomitant costs.

Impact on The Poor :

Shrimp cultivation is less labour intensive than agriculture. Moreover, shrimp farmers reserve the better jobs for outsiders. Only the menial jobs of embankment maintenance and clearing the ponds of water-weeds are given to local men and women. As a result, shrimp aqua-culture has createrd a massive unemployment situation in the region.

Decline of agriculture as well as the destruction of grazing due to salinity has generated a fodder crisis for cattle. Most of the farmers sold off their cattle. Only a few farmers maintain cattle for their essential agricultuiral needs, but these have to be kept with poor and landless people outside the shrimp areas and the owners have to pay for their upkeep. Decline in the number of cattle has also brought the milk supply almost to nil, and thus negatively affected the nutrition of the children.

The poor have lost access to common resources in the public domain, as they too have been taken over by the shrimp farmers. Thus the canals, fallow lands, etc. which used to be a source of supplementary income for the poor, have been lost. Now, the poor have to buy fish for self-consumption.

Death of all vegetation in the region has compelled the people to buy firewood, thus increasing pressure on the Sunderbans.

Poor farmers have not only lost the opportunity to produce multiple crops on their lands, even the one crop they are allowed to raise, has been greatly reduced because of the shrimp farmers' insistence that no chemical fertiliser or pesticides could be used.

Impact on Women and Children :

Women have lost the opportunity to earn a supplementary income by keeping domestic animals and poultry, as well as by growing vegetables on homestead lands. In addition to loss of cash income from such sources, family nutrition, especially that of children, has been badly affected.

Having lost the sources of supplementary income, women have lost the status they used to enjoy in the family and in the society, and have now become victims of abuse even by their own men-folk.

Valuable time that women could have utilised for productive activity is lost by having to walk long distances – in cases upto three miles – to fetch potable drinking water.

A large number of males have migrated to urban centres in search of employment, leaving female-headed families behind, and the women have been constrained to take up menial jobs to maintain themselves and their children.

Women who never worked outside their homesteads are now compelled to work in the "ghers", in shrimp depots and in the processing plants at low wages.

Women have become more vulnerable to sexual harassment and even rape in their work-places or on the way to and fro, by employers as well as by their male co-workers.

Even at home they are not safe from molestation. The armed "security guards" employed by the "gher" owners enter the adjacent villages at night and molest the women and even plunder their valuables.

Denial of access to common resources in the public domain, decline in cattle and poultry population, deforestation of the homestead orchards and vegetable gardens, all have reduced the availability of nutritious food, resulting in serious malnutrition of women and children.

Children have been the worst sufferers due to malnutrition and by being compelled to become wage earners or shrimp fry collectors at an early age.

Salinity has driven away all the fresh water fishes from the waters of the region.

Feeding grounds of fishes have been much reduced in area.

Shrimp fry collection kills off a large number of fry of other varieties of fish, resulting in massive loss to bio-diversity in the waters of the rivers and estuaries.

Impact on Food Security :

The region once used to be surplus in food. Since the expansion of shrimp culture in the region, rice production has declined, and now has to import rice from other areas of Bangladesh.

Impact on The Sunderbans :

Massive unemployment has compelled large numbers of people to engage in illegal extraction of forest products for their livelihood.

Destruction of trees and other vegetation has compelled the inhabitants of the shrimp cultivation areas to depend more and more on the Sunderbans for firewood.

Decline of agriculture has reduced the availability of rice straw, which is used as fodder as well as for thatching. Dried cow dung is also used as cooking fuel. These lacks have resulted in increased exploitation of the already over-exploited Sunderbans.

Impact on Environment in General :

Soil salinity, resulting from brackish water shrimp aquaculture on a large scale has resulted in the death of all vegetation in the region, causing massive desertification. To those accustomed to the natural greenery of the Bangladesh countryside, the shrimp growing region presents a desolate look.

Restriction of space has resulted in damage to sanitation in the area, adversely affecting the health of the inhabitants, especially the poor.

Decimation of crabs and snails, which are known as the "scavengers of the waters" has increased river pollution in the region.

Salinity has created a crisis for potable water for human use. People have to walk long distances – even as far as three miles – to fetch drinking water.

Social Conflicts :

The expansion of shrimp cultivation has generated social conflicts in many areas. The worst affected people are the poor and marginal farmers and the landless. Faced with total loss of occupation, people have resorted to confrontation with the shrimp farmers, who have retaliated with violence, resulting in deaths and injuries. But affected people have even defied death and injuries, and have continued to agitate against the destructive methods of shrimp farming. Shrimp farming has also led to massive corruption and an increase in the number of court cases. A few instances of shrimp related conflicts are briefly touched upon below :

Khukshiar Beel, July, 1988 :

Khukshiar Beel is said to be the most low-lying area in Keshabpur thana of Jessore district, with 27 beels in Keshabpur and Monirampur thanas draining off their surplus waters through this beel. A canal running through this beel is the main drainage channel.

In 1988, one Majid Golder of Agurhati village established a "gher" covering 1060 bighas of land(about 350 acres) which also included the government-owned canal. But in the face of massive public protest, the enterpreneur abandoned the project.

Dahurir Beel, July, 1988 :

Not far from the Khukshiar Beel is the Dahurir Beel in Keshabpur thana, near the border with Dumuria thana. In May, 1988, one Atiar Khan of Dumuria leased several hundred acres of land from absentee landlords and established a "gher" in the area. The embankment constructed for the "gher" blocked the drainage of Dahurir Beel as well as of the adjacent Bhainar Beel.

In mid-July, 1988, there was continuous rain for several days, which resulted in severe water-logging in both the beels. Standing crops were damaged by the inundation and many cattle drowned. On July 22, a large assembly of the affected people went on a protest march, but the mercenary "guards" imported from outside by the "gher" owner, supported by a contingent of police brought over from Dumuria, fired on the procession, resulting in one death and scores of injuries. A tension-ridden uneasy status-quo prevailed in the region for a number of years afterwards, and the period was hectic with arrests, court cases and counter-cases.

Polder No. 22 :

Polder No. 22 was constructed in Paikgacha thana of Khulna district in the 1980's by the Bangladesh Water Development Board (BWDB) with financial cooperation from the government of The Netherlands. It was known as the Delta Development Project (DDP). When the project was taken up, there was an understanding that there would be no shrimp cultivation inside the polder. Accordingly, the people produced multiple crops and led a comparatively better life than the people in the adjacent Shrimp cultivating areas.

But a few big absentee land-owners were not satisfied with the situation. They wanted to become shrimp farmers themselves, but lacked the technique to put the programme through. So they invited one Wajed Ali Biswas, a well known shrimp farmer who owned a number of large "ghers" in the region.

During May-June,1990, the news spread that Wajed Ali Biswas was going to establish a "gher" in Polder No.22. After signing lease agreements with a number of absentee land-owners of the area, the agents of Wajed Ali Biswas, protected by a contingent of armed mercenaries, began to go around the villages at night and by using threat, compelled a number of people to sign lease agreements at gun-point. Great resentment spread in the area as a result of these strong-arm tactics, especially among the small and marginal farmers and the landless. Due to the existing fresh-water regime in the polder, many landless families were able to earn a supplementary income by keeping and caring for the cattle belonging to people living in saline shrimp areas outside the polder. They were also very well aware of the environmental and socio-economic damages that could be caused by brackish water shrimp farming on a large scale. They realised that if Bagda "ghers" were establisherd in Polder No.22, the poor and marginal farmers as well as the landless, and women of all classes would be adversely affected. After several months of uneasy tension, marked by dozens of meetings attended by people in their thousands, it was learnt on November 4, 1990 that the armed mercenaries of Wajed Ali Biswas would arrive at Harinkhola on November 7 to take possession of the leased lands.

The rumour proved to be correct, and in the early morning of November 7, 10 boatloads of men armed with sharp weapons as well as firearms, landed on the embankment of polder 22 at Harinkhola.

When a protest march led by women approached them, the armed mercenaries opened fire indiscriminately, killing one Karunamoyee Sardar instantly and injuring nearly 50 others, most of whom were women.

Though cases and counter-cases arising out of the incident are still being dragged out in courts, Polder No.22 has so far remained shrimp-free. The martyrdom of Karunamoyee Sardar has provided the anti-shrimp movement with a powerful Icon.

The Landless of Debhata Kaliganj :

Several thousand acres of land had become state property in Satkhira district as a result of the East Pakistan Land Aquisition and Tenancy Act of 1950. But the dispossessed big landlords had managed to hold on to the land by means of a subterfuge, namely, forming an "agricultural cooperative". But after the liberation of Bangladesh, the lands reverted to the possession of the government.

As settlement of landless farmers has always been an accepted policy of the government, landless people gradually came and settled on those lands. The district administration used to give each family one acre of land on annual lease. The leases had to be renewed every year.

During the 1980's, when shrimp cultivation began to reach the status of a glamour industry on account of the high profits, a number of greedy enterpreneurs, including some officials of the defunct cooperative, corrupted the officials and had those lands reclassified as "Jalmahal"(water-body). Thus they circumvented the claim of the landless, as water-bodies cannot be separated into one-acre plots.

The shrimp farmers obtained lease of all the land and sent in armed mercenaries to evict the landless. The hired muscle-men demolished hundreds of houses of the landless, plundered their valuables and physically assaulted men, women and children, on May 10, 1998 The incident became headline news for all the local and national newspapers. Public protests congtinued through the following weeks and months.

On July 27 of the same year, police and the hired mercenaries of the shrimp farmers fired upon a procession of mostly women and children at Baburabad, one of the nine villages straddling Debhata and Kaliganj upazilas of Satkhira district, on which the landless had settled. Landless housewife and mother of five Jaheda was killed on

the spot and two infants drowned in the stampede that followed. About a hundred of the processionists were injured, more than half of them women.

NGOs and other volunteers gave relief to the victims of the firing, by having them admitted to hospitals in Satkhira, Jessore and Khulna, buying medicines for them, and arranging for food and other expenses of their relatives who had to help nurse them in the hospitals. Many people also voluntarily donated blood for those who needed it.

The ensuing publicity brought many prominent personalities to the region, including the leaders of the opposition in parliament, and finally the honourable prime minister herself. At a mass rally organised at Debhata in November, the prime minister assured the landless that they would be settled on state-owned agricultural land in accordance with government principles.

These incidents and their aftermath also bring to light the admirable role of the journalists, NGOs and general public who have expressed their sympathies and spent their time and effort and donated blood and money for the relief and treatment of the injured. The citizens of Khulna city and Satkhira town have also formed support groups for the landless. The village Baburabad, where the firing incident occurred, has been renamed by the landless as "Jaheda Nagar" in commemoration of the matrtyred housewife Jaheda.

Tension still continues to simmer under the surface in all the shrimp areas, especially in Paikgacha, Tala, Dumuria, Batiaghata and Dacope regions, and occasionally erupt in incidents of violence.

Comments : Although everybody is seriously concerned about the negative socio-economic and environmental impacts of industrial shrimp cultivation, there exists a range of different opinions in respect of a remedy or remedies. Some consider that shrimp cultivation should be banned entirely, while others think that small shrimp farms may not be so damaging, but everybody is of the same mind as regards the long-term damages being caused by industrial shrimp cultivation on a large scale and about the widespread movement against it. Accordingly, on the basis of the above facts, a set of recommendations which reflects every shade of opinion opposed to industrial shrimp cultivation has been formulated here.

* The Government of Bangladesh must lay down strict policy guidelines for shrimp cultivation in the country, and those guidelines must be strictly enforced. Cultivation of Brackish water Bagda shrimps must be restricted to areas where rice cultivation is not possible during the dry months of the year. Even then it must be restricted to the period from February to July. During the monsoon season, when the salinity is washed away by the rains, cultivation of indigenous varieties of rice must be encouraged.

* The collectors of post-larvae and fry of shrimps from the rivers and creeks must be rehabilitated by providing alternative income generating sources of livelihood for them, and the practice of collection of shrimp fry and post-larvae from the rivers and canals must be gradually restricted and ultimately banned altogether, in order to prevent further damage to the aquatic biodiversity.

* Hatcheries for productiion of Golda prawn and Bagda shrimp fry in adequate quantities must be established. The private sector may be encouraged in this respect, and necessary training and other technical and financial support may be arranged.

* Shrimp cultivation must be restricted to the period from February to July in all areas where rice cultivation is feasible during the monsoon, and farmers may be encouraged and motivated to plant indigenous, salinity-tolerant and flood-tolerant varieties of rice. These varieties do not require chemical fertilisers or pesticides, thus minimising envioronmental degradation. This will also help conserve the bio-diversity of rice in the country.

* A limit must be put on the size of "ghers", not exceeding 5-6 hectares (12-15 acres). Such "pocket ghers" are more often than not owned by the inhabitants of the concerned localities, either singly or in small cooperative groups, and being locals, they have a sense of responsibnility towards the local envcironment, as well as to their neighbours and the local "Shamaj"(Society).

* The deforested shrimp regions must be re-forested with salinity tolerant mangrove varieties on the banks of rivers and canals and on the embankments of shrimp ponds. Salinity-tolerant grasses may also be introduced, to enable the inhabitants to rear cattle.

* Housewives may be motivated to cultivate vegetables around their homesteads and also keep poultry and ducks.
* "Meley" is a sedge-like marsh grass that grows in brackish water. Its flower stems grow upto and above 6'-0" in height and are used in weaving mats and other basketry materials. "Meley–cum-fish" or "Meley-cum-shrimp" can be cultivated by small land-owners in the saline areas, as it will give them two crops instead of one. The availability of the raw materials will also increase supplementary employment opportunities for women mat weavers in the community.

Consumer taste is fickle, and their present preference for shrimp may also change. But as long as there is a world-wide demand for shrimps, prawns and lobsters, and as long as Bangladeshi farmers cultivate them, the above recommendations may help to alleviate the existing deplorable situation in the shrimp areas.

Future water management projects may also alter the characteristics of the region, by changing it into one of a fresh water regime. In that case, the farmers may simply change over to the fresh water Golda prawns, and such a change-over would not be unwelcome, at least as regards salinmity is concerned. But, as stated earlier, monoculture of any species is detrimental to the environment and it will create a negative impact in the long run. As such it would be advisable to create awareness among the people and persuade them to act in a responsible manner, and create an environment that would help them adopt methodologies and practices that would not be detrimental to Nature and to Society.

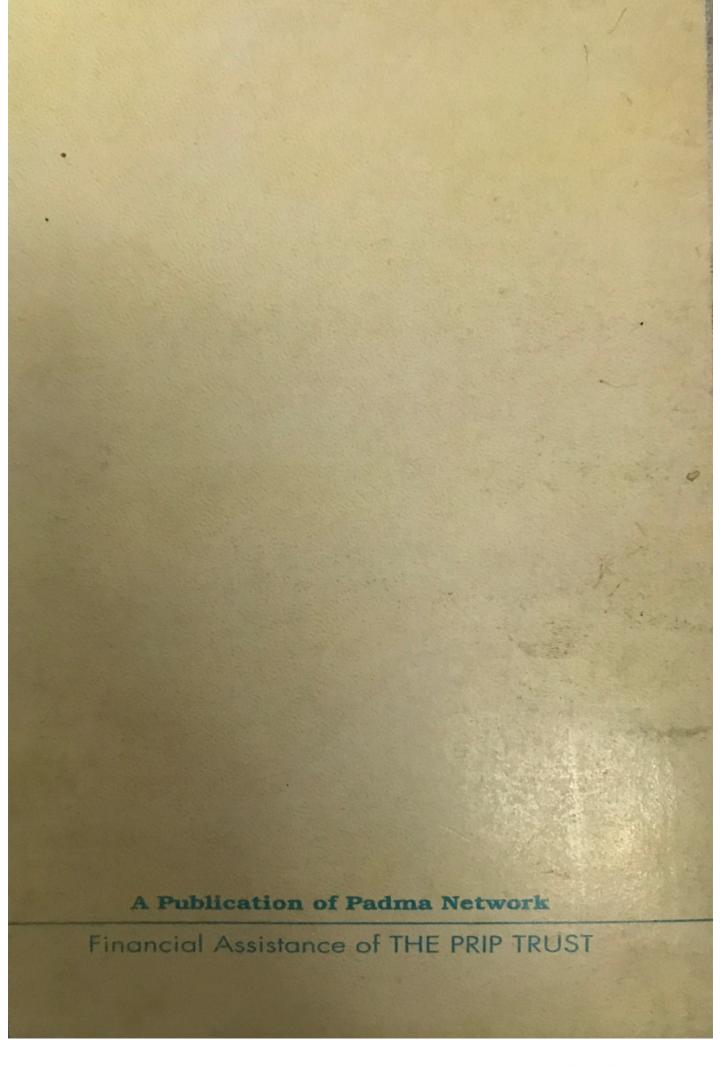
Conclusion :

The whole history of shrimp and prawn cultivation in this south-western coastal region as well as elsewhere in Bangladesh, shows a severe lack of policy and direction. There appears to be no distinct policy as regards shrimp culture. Everything is being conducted on an ad-hoc basis, and decisions are left in the hands of local bureaucrats.

Export of shrimps from Bangladesh forms a very insignificant portion of the total world trade in that commodity. Bangladesh exported a little over 39,000 tonnes in the financial year 1999-2000, as against the annual world average of two million tonnes. Even if the

Bangladeshi exporters manage to double their overseas sales, it will not affect the world trade in that commodity in any significant manner. Moreover, not one of the millions of dollars earned by those exporters filters down to the people who contribute to its primary production, namely, the fry collectors, the men and women labourers in the shrimp ponds or "ghers" as they are called, and the thousands of women and men employed in the processing plants. They get only minimum wages.

But as long as there is profit in shrimp, in excess of rice or any other product from the same acreage., people will continue to cultivate shrimps and prawns in their low-lying lands.

In order, therefore, to bring about order and discipline in the sector, and to make it less destructive to the environment and to the socio-economic fabric of the shrimp cultivating regions, it is necessary to take certain initiatives.

Left with no other resource or occupation, women and children have been compelled to eke out a living by collection of shrimp fry and post-larvae from the rivers and canals of the region.

Exposed to cash income at an early age, children have become unruly and rowdy, showing a disposition towards anti-social behaviour.

Trafficking of women and children has increased in the rural areas of the region due to various factors related to shrimp culture.

Impact on Capture Fisheries and Fishermen :
Most of the large scale shrimp farmers have also enclosed all the canals within the polders, resulting in denial of access to those canals for the fishermen.

The general reduction of the fish stocks in the region due to massive destruction of fish fry in the shrimp fry collection process has also reduced the income of fishermen.

Enclosure of tidal flood plains has deprived the fish of their feeding grounds; so the fish have migrated to better feeding areas elsewhere.

Impact on Bio-Diversity :
Frogs have been decimated, because, from the point of view of the shrimp farmers, the frogs eat shrimp fry.

Local species of otters are also not seen any longer in the shrimp areas, as they have been either driven off or killed by the security guards of the shrimp farms, in order to protect their shrimp stocks.

Permanent salinity of land and water has killed off all trees, bushes and grasses. Birds live on fruits, berries, grass seeds and insects. Destruction of all vegetation has not only destroyed the food source, but also the habitat for birds. Lacking both food and shelter, birds that used to frequent this area are no longer to be seen.

The shrimp farmers have also killed off most of the crab population. Snail meat is considered a nutritious food for shrimps. As a result, large quantities of snails are caught every day, thus depleting the stock of snails in the entire region.

Even migratory birds have been frightened away by the security guards of the shrimp farmers.